



#10

SUBSTITUTE SEQUENCE LISTING

<110> PURDUE RESEARCH FOUNDATION

Sanders, David

Kuhn, Richard

Jeffers, Scott

Sharkey, Curtis

North, Cynthia

Fischbach, Michael

<120> PSEUDOTYPED RETROVIRUSES AND STABLE CELL LINES FOR THEIR PRODUCTION

<130> 290.00490101

<140> 09/762,224

<141> 2001-02-02

<150> US 60/095,242

<151> 1998-08-04

<150> US 60/112,405

<151> 1998-12-15

<150> PCT/US99/17702

<151> 1999-08-04

<160> 8

<170> PatentIn version 3.0

<210> 1

<211> 2958

<212> DNA

<213> Ross River virus

<400> 1

atgtctgccg cgctgatgat gtgtatcctt gccaacacct ctttcccctg ctcatcacct	60
ccctgctacc cctgctgcta cgaaaaacag ccagaacaga cactgcggat gctggaagac	120
aatgtgaata gaccagggtta ctatgagcta ctggaagcgt ccatgacatg cagaaacaga	180
tcacgccacc gccgtagtgt aacagagcac ttcaatgtgt ataaggctac tagaccgtac	240
ttagcgattt gcgctgactg tggggacggg tacttctgct atagcccagt tgctatcgag	300
aagatccgag atgaggcgct tgacggcatg ctcaagatcc aagtctccgc ccaaataagg	360
ctggacaagg caggtaccca cgcccacacg aagatccgat atatggctgg tcatgatgtt	420
caggaatcta agagagattc cttgaggggtg tacacgtccg cagcgtgctc tatacatggg	480
acgatgggac acttcatcgt cgcacattgt ccgccaggcg actacctcaa ggtttcgttc	540
gaggacgcag attcacacgt gaaggcatgt aagggtccaat acaagcacga cccattgccg	600
gtgggtagag agaagttcgt ggtagaccc cactttggcg tagagctgcc atgcacctca	660
taccagctga caacagctcc caccgacgag gagatcgaca tgcacacacc gccagatata	720
ccggatcgca ccctgctatc acagacggcg ggcaacgtca aaataacagc aggcggcagg	780
actatcaggt acaattgtac ctgtggccgt gacaacgtag gcactaccag tactgacaag	840
accatcaaca catgcaagat tgaccaatgc catgctgccg ttaccagcca tgacaaatgg	900
caatttacct ctccatttgt tcccagggt gatcagacag ctagggagggg caaagtgc	960
gttccattcc ctttgactaa cgtcacctgc cgagtgccgt tggctcgagc gccggatgtc	1020
acctatggta agaaggaggt gaccctgaga ttacaccag atcatccgac gctcttctcc	1080
tataggagtt taggagccga accgcacccg tacgaggagt gggttgacaa gttctctgag	1140
cgcacatcc cagtgcgga agaagggtt gaggaccagt ggggcaacaa cccgccggtc	1200
cgcctatggg cgcaactgac gaccgagggc aaaccccatg gctggccaca tgaaatcatt	1260
cagtactatt atggactata ccccgccgcc accattgccg cagtatccgg ggcgagtctg	1320
atggccctcc taactctagc ggccacatgc tgcagtctgg ccaccgcgag gagaaagtgc	1380
ctaaccacat acgccttgac gccaggagcg gtggtaccgt tgacactggg gctgctttgc	1440
tgcgcaccga gggcgaacgc agcatcattc gctgagacta tggcatatct gtgggacgag	1500
aacaaaaccc tcttttggat ggaattcgcc gcccagccg cagcgttgc tttgctggca	1560
tgctgtatca aaagcctgat ctgctgttgt aagccatttt cttttttagt gttactgagc	1620
ctgggagcct ccgcaaaagc ttacgagcac acagccacaa ttccgaatgt ggtgggggttc	1680
ccgtataagg ctcacattga aaggaatggc ttctcgccca tgactctgca gcttgaagtg	1740

gtggagacaa gcttgggaacc cacacttaac ctggagtaca ttacctgcga atacaagacg	1800
gtgggtccctt cgccattcat caaatgttgc ggaacatcag aatgctcatc caaggagcag	1860
ccagactacc aatgcaaggt gtacacgggt gtatacccat tcatgtgggg tggagcctac	1920
tgtttctgcg actccgagaa cacgcagctc agcgaggcct atgtcgacag gtcagacgtt	1980
tgcaaacatg atcacgcac ggccatacag gcacacacgg cctctctaaa agcaacaatc	2040
aggatcagtt atggcaccat caaccagacc accgaggcct tcgttaatgg tgaacacgcg	2100
gtcaacgtgg gcggaagcaa gttcatcttt ggaccgatct caacagcttg gtcaccgttc	2160
gacaataaaa ttgtcgtgta taaagatgat gtctacaacc aggacttccc accctacgga	2220
tcaggccagc cgggtagatt cggagacatt cagagcagga cagtggagag caaagacttg	2280
tatgccaaca cggccctaaa actctcaaga ccatcacccg gggttgtgca tgtgccatac	2340
acgcagacac catccggatt taaatattgg ctgaaggaga aaggatcttc attgaataca	2400
aaggccctt ttggctgcaa gataaagacc aatccagtca gagccatgga ttgtgcagtt	2460
ggcagtatac ctgtgtcgat ggacatacct gacagtgcac tcacacgagt ggtagatgcc	2520
ccggctgtaa cagacctgag ctgccaggta gtggtctgta cacactcctc cgatttcgga	2580
ggagttgcca cattgtctta caaaacggac aaaccggca agtgcgctgt ccactcacat	2640
tccaacgtcg caacgttgca agaggcgacg gtggatgtca aggaggatgg caaggtcaca	2700
gtgcactttt ccacggcgctc cgctccccg gccttcaaag tgtccgtctg tgacgcaaaa	2760
acaacgtgca cggcggcgctg cgagcctcca aaagaccaca tcgtccctta tggggcgagc	2820
cataacaacc aggtctttcc ggacatgtca ggaactgcga tgacgtgggt gcagaggctg	2880
gccagtgggt taggtgggct ggctctcatc gcggtgggtg tgctgggtctt ggtaacctgc	2940
ataacaatgc gtcggtaa	2958

<210> 2

<211> 985

<212> PRT

<213> Ross River virus

<400> 2

Met	Ser	Ala	Ala	Leu	Met	Met	Cys	Ile	Leu	Ala	Asn	Thr	Ser	Phe	Pro
1				5					10					15	
Cys	Ser	Ser	Pro	Pro	Cys	Tyr	Pro	Cys	Cys	Tyr	Glu	Lys	Gln	Pro	Glu
			20					25					30		
Gln	Thr	Leu	Arg	Met	Leu	Glu	Asp	Asn	Val	Asn	Arg	Pro	Gly	Tyr	Tyr
		35					40					45			

Glu Leu Leu Glu Ala Ser Met Thr Cys Arg Asn Arg Ser Arg His Arg
 50 55 60
 Arg Ser Val Thr Glu His Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr
 65 70 75 80
 Leu Ala Tyr Cys Ala Asp Cys Gly Asp Gly Tyr Phe Cys Tyr Ser Pro
 85 90 95
 Val Ala Ile Glu Lys Ile Arg Asp Glu Ala Ser Asp Gly Met Leu Lys
 100 105 110
 Ile Gln Val Ser Ala Gln Ile Gly Leu Asp Lys Ala Gly Thr His Ala
 115 120 125
 His Thr Lys Ile Arg Tyr Met Ala Gly His Asp Val Gln Glu Ser Lys
 130 135 140
 Arg Asp Ser Leu Arg Val Tyr Thr Ser Ala Ala Cys Ser Ile His Gly
 145 150 155 160
 Thr Met Gly His Phe Ile Val Ala His Cys Pro Pro Gly Asp Tyr Leu
 165 170 175
 Lys Val Ser Phe Glu Asp Ala Asp Ser His Val Lys Ala Cys Lys Val
 180 185 190
 Gln Tyr Lys His Asp Pro Leu Pro Val Gly Arg Glu Lys Phe Val Val
 195 200 205
 Arg Pro His Phe Gly Val Glu Leu Pro Cys Thr Ser Tyr Gln Leu Thr
 210 215 220
 Thr Ala Pro Thr Asp Glu Glu Ile Asp Met His Thr Pro Pro Asp Ile
 225 230 235 240
 Pro Asp Arg Thr Leu Leu Ser Gln Thr Ala Gly Asn Val Lys Ile Thr
 245 250 255
 Ala Gly Gly Arg Thr Ile Arg Tyr Asn Cys Thr Cys Gly Arg Asp Asn
 260 265 270
 Val Gly Thr Thr Ser Thr Asp Lys Thr Ile Asn Thr Cys Lys Ile Asp
 275 280 285
 Gln Cys His Ala Ala Val Thr Ser His Asp Lys Trp Gln Phe Thr Ser
 290 295 300
 Pro Phe Val Pro Arg Ala Asp Gln Thr Ala Arg Arg Gly Lys Val His
 305 310 315 320
 Val Pro Phe Pro Leu Thr Asn Val Thr Cys Arg Val Pro Leu Ala Arg
 325 330 335
 Ala Pro Asp Val Thr Tyr Gly Lys Lys Glu Val Thr Leu Arg Leu His
 340 345 350
 Pro Asp His Pro Thr Leu Phe Ser Tyr Arg Ser Leu Gly Ala Glu Pro
 355 360 365
 His Pro Tyr Glu Glu Trp Val Asp Lys Phe Ser Glu Arg Ile Ile Pro
 370 375 380

Val Thr Glu Glu Gly Ile Glu Tyr Gln Trp Gly Asn Asn Pro Pro Val
 385 390 395 400
 Arg Leu Trp Ala Gln Leu Thr Thr Glu Gly Lys Pro His Gly Trp Pro
 405 410 415
 His Glu Ile Ile Gln Tyr Tyr Tyr Gly Leu Tyr Pro Ala Ala Thr Ile
 420 425 430
 Ala Ala Val Ser Gly Ala Ser Leu Met Ala Leu Leu Thr Leu Ala Ala
 435 440 445
 Thr Cys Cys Met Leu Ala Thr Ala Arg Arg Lys Cys Leu Thr Pro Tyr
 450 455 460
 Ala Leu Thr Pro Gly Ala Val Val Pro Leu Thr Leu Gly Leu Leu Cys
 465 470 475 480
 Cys Ala Pro Arg Ala Asn Ala Ala Ser Phe Ala Glu Thr Met Ala Tyr
 485 490 495
 Leu Trp Asp Glu Asn Lys Thr Leu Phe Trp Met Glu Phe Ala Ala Pro
 500 505 510
 Ala Ala Ala Leu Ala Leu Leu Ala Cys Cys Ile Lys Ser Leu Ile Cys
 515 520 525
 Cys Cys Lys Pro Phe Ser Phe Leu Val Leu Leu Ser Leu Gly Ala Ser
 530 535 540
 Ala Lys Ala Tyr Glu His Thr Ala Thr Ile Pro Asn Val Val Gly Phe
 545 550 555 560
 Pro Tyr Lys Ala His Ile Glu Arg Asn Gly Phe Ser Pro Met Thr Leu
 565 570 575
 Gln Leu Glu Val Val Glu Thr Ser Leu Glu Pro Thr Leu Asn Leu Glu
 580 585 590
 Tyr Ile Thr Cys Glu Tyr Lys Thr Val Val Pro Ser Pro Phe Ile Lys
 595 600 605
 Cys Cys Gly Thr Ser Glu Cys Ser Ser Lys Glu Gln Pro Asp Tyr Gln
 610 615 620
 Cys Lys Val Tyr Thr Gly Val Tyr Pro Phe Met Trp Gly Gly Ala Tyr
 625 630 635 640
 Cys Phe Cys Asp Ser Glu Asn Thr Gln Leu Ser Glu Ala Tyr Val Asp
 645 650 655
 Arg Ser Asp Val Cys Lys His Asp His Ala Ser Ala Tyr Lys Ala His
 660 665 670
 Thr Ala Ser Leu Lys Ala Thr Ile Arg Ile Ser Tyr Gly Thr Ile Asn
 675 680 685
 Gln Thr Thr Glu Ala Phe Val Asn Gly Glu His Ala Val Asn Val Gly
 690 695 700
 Gly Ser Lys Phe Ile Phe Gly Pro Ile Ser Thr Ala Trp Ser Pro Phe
 705 710 715 720
 Asp Asn Lys Ile Val Val Tyr Lys Asp Asp Val Tyr Asn Gln Asp Phe

catccacaat agcacattac aggttagtga tgtcgacaaa ctagtttgtc gtgacaaact	180
gtcatccaca aatcaattga gatcagttgg actgaatctc gaaggggaatg gagtggcaac	240
tgacgtgcca tctgcaacta aaagatgggg cttcaggtcc ggtgtccac caaaggtggt	300
caattatgaa gctggtgaat gggctgaaaa ctgctacaat cttgaaatca aaaaacctga	360
cgggagtgag tgtctaccag cagcgccaga cgggattcgg ggcttcccc ggtgccggta	420
tgtgcacaaa gtatcaggaa cgggaccgtg tgccggagac ttgaccttcc ataaagaggg	480
tgctttcttc ctgtatgac gacttgcttc cacagttatc taccgaggaa cgactttcgc	540
tgaaggtgtc gttgcatttc tgatactgcc ccaagctaag aaggacttct tcagctcaca	600
ccccttgaga gagccggtca atgcaacgga ggaccgtct agtggtact attctaccac	660
aattagatat caggctaccg gttttggaac caatgagaca gagtacttgt tcgaggttga	720
caatttgacc tacgtccaac ttgaatcaag attcacacca cagtttctgc tccagctgaa	780
tgagacaata tatacaagtg ggaaaaggag caataccacg ggaaaactaa tttggaaggt	840
caaccccgaa attgatacaa caatcgggga gtgggccttc tgggaaacta aaaaaacct	900
cactagaaaa attcgagtg aagagttgtc ttccacagtt gtatcaaacg gagccaaaaa	960
catcagtggg cagagtccgg cgcgaacttc ttccgaccca gggaccaaca caacaactga	1020
agaccacaaa atcatggctt cagaaaattc ctctgcaatg gttcaagtgc acagtcaagg	1080
aaggggaagct gcagtgtcgc atctaacaac ccttgccaca atctccacga gtccccaatc	1140
cctcacaacc aaaccaggtc cggacaacag caccataat acaccgtgt ataaacttga	1200
catctctgag gcaactcaag ttgaacaaca tcaccgcaga acagacaacg acagcacagc	1260
ctccgacact ccctctgcca cgaccgcagc cggaccccca aaagcagaga acaccaacac	1320
gagcaagagc actgacttcc tggaccccg caccacaaca agtccccaaa accacagcga	1380
gaccgtggc aacaacaaca ctcatcacca agataccgga gaagagagtg ccagcagcgg	1440
gaagctaggc ttaattacca atactattgc tggagtcgca ggactgatca caggcgggag	1500
aagaactcga agagaagcaa ttgtcaatgc tcaacccaaa tgcaacccta atttacatta	1560
ctggactact caggatgaag gtgctgcaat cggactggcc tggataccat atttcgggcc	1620
agcagccgag ggaatttaca tagaggggct aatgcacaat caagatggtt taatctgtgg	1680
gttgagacag ctggccaacg agacgactca agctcttcaa ctgttcctga gagccacaac	1740
tgagctacgc accttttcaa tcctcaaccg taaggcaatt gatttcttgc tgcagcgatg	1800
gggcggcaca tgccacattc tgggaccgga ctgctgtatc gaaccacatg attggaccaa	1860
gaacataaca gacaaaattg atcagattat tcatgatttt gttgataaaa cccttccgga	1920
ccagggggac aatgacaatt ggtggacagg atggagacaa tggataccgg caggtattgg	1980
agttacaggc gttataattg cagttatcgc ttattctgt atatgcaa atttgtctttta	2040

gtttttcttc agattgcttc atggaaaagc tcagcctcaa atcaatgaaa ccaggattta 2100
attatatgga ttacttgaat ctaagattac ttgacaaatg ataataataat aactggagc 2160
tttaaacata gccaatgtga ttctaactcc tttaaactca cagttaatca taaacaaggc 2220
ttga 2224

<210> 4

<211> 676

<212> PRT

<213> Ebola virus

<400> 4

Met Gly Val Thr Gly Ile Leu Gln Leu Pro Arg Asp Arg Phe Lys Arg
1 5 10 15
Thr Ser Phe Phe Leu Trp Val Ile Ile Leu Phe Gln Arg Thr Phe Ser
20 25 30
Ile Pro Leu Gly Val Ile His Asn Ser Thr Leu Gln Val Ser Asp Val
35 40 45
Asp Lys Leu Val Cys Arg Asp Lys Leu Ser Ser Thr Asn Gln Leu Arg
50 55 60
Ser Val Gly Leu Asn Leu Glu Gly Asn Gly Val Ala Thr Asp Val Pro
65 70 75 80
Ser Ala Thr Lys Arg Trp Gly Phe Arg Ser Gly Val Pro Pro Lys Val
85 90 95
Val Asn Tyr Glu Ala Gly Glu Trp Ala Glu Asn Cys Tyr Asn Leu Glu
100 105 110
Ile Lys Lys Pro Asp Gly Ser Glu Cys Leu Pro Ala Ala Pro Asp Gly
115 120 125
Ile Arg Gly Phe Pro Arg Cys Arg Tyr Val His Lys Val Ser Gly Thr
130 135 140
Gly Pro Cys Ala Gly Asp Phe Ala Phe His Lys Glu Gly Ala Phe Phe
145 150 155 160
Leu Tyr Asp Arg Leu Ala Ser Thr Val Ile Tyr Arg Gly Thr Thr Phe
165 170 175
Ala Glu Gly Val Val Ala Phe Leu Ile Leu Pro Gln Ala Lys Lys Asp
180 185 190
Phe Phe Ser Ser His Pro Leu Arg Glu Pro Val Asn Ala Thr Glu Asp
195 200 205
Pro Ser Ser Gly Tyr Tyr Ser Thr Thr Ile Arg Tyr Gln Ala Thr Gly
210 215 220

Phe Gly Thr Asn Glu Thr Glu Tyr Leu Phe Glu Val Asp Asn Leu Thr
 225 230 235 240
 Tyr Val Gln Leu Glu Ser Arg Phe Thr Pro Gln Phe Leu Leu Gln Leu
 245 250 255
 Asn Glu Thr Ile Tyr Thr Ser Gly Lys Arg Ser Asn Thr Thr Gly Lys
 260 265 270
 Leu Ile Trp Lys Val Asn Pro Glu Ile Asp Thr Thr Ile Gly Glu Trp
 275 280 285
 Ala Phe Trp Glu Thr Lys Lys Asn Leu Thr Arg Lys Ile Arg Ser Glu
 290 295 300
 Glu Leu Ser Phe Thr Val Val Ser Asn Gly Ala Lys Asn Ile Ser Gly
 305 310 315 320
 Gln Ser Pro Ala Arg Thr Ser Ser Asp Pro Gly Thr Asn Thr Thr Thr
 325 330 335
 Glu Asp His Lys Ile Met Ala Ser Glu Asn Ser Ser Ala Met Val Gln
 340 345 350
 Val His Ser Gln Gly Arg Glu Ala Ala Val Ser His Leu Thr Thr Leu
 355 360 365
 Ala Thr Ile Ser Thr Ser Pro Gln Ser Leu Thr Thr Lys Pro Gly Pro
 370 375 380
 Asp Asn Ser Thr His Asn Thr Pro Val Tyr Lys Leu Asp Ile Ser Glu
 385 390 395 400
 Ala Thr Gln Val Glu Gln His His Arg Arg Thr Asp Asn Asp Ser Thr
 405 410 415
 Ala Ser Asp Thr Pro Ser Ala Thr Thr Ala Ala Gly Pro Pro Lys Ala
 420 425 430
 Glu Asn Thr Asn Thr Ser Lys Ser Thr Asp Phe Leu Asp Pro Ala Thr
 435 440 445
 Thr Thr Ser Pro Gln Asn His Ser Glu Thr Ala Gly Asn Asn Asn Thr
 450 455 460
 His His Gln Asp Thr Gly Glu Glu Ser Ala Ser Ser Gly Lys Leu Gly
 465 470 475 480
 Leu Ile Thr Asn Thr Ile Ala Gly Val Ala Gly Leu Ile Thr Gly Gly
 485 490 495
 Arg Arg Thr Arg Arg Glu Ala Ile Val Asn Ala Gln Pro Lys Cys Asn
 500 505 510
 Pro Asn Leu His Tyr Trp Thr Thr Gln Asp Glu Gly Ala Ala Ile Gly
 515 520 525
 Leu Ala Trp Ile Pro Tyr Phe Gly Pro Ala Ala Glu Gly Ile Tyr Ile
 530 535 540
 Glu Gly Leu Met His Asn Gln Asp Gly Leu Ile Cys Gly Leu Arg Gln
 545 550 555 560
 Leu Ala Asn Glu Thr Thr Gln Ala Leu Gln Leu Phe Leu Arg Ala Thr

565	570	575
Thr Glu Leu Arg Thr Phe Ser Ile	Leu Asn Arg Lys Ala Ile Asp Phe	
580	585	590
Leu Leu Gln Arg Trp Gly Gly Thr	Cys His Ile Leu Gly Pro Asp Cys	
595	600	605
Cys Ile Glu Pro His Asp Trp Thr	Lys Asn Ile Thr Asp Lys Ile Asp	
610	615	620
Gln Ile Ile His Asp Phe Val Asp Lys Thr	Leu Pro Asp Gln Gly Asp	
625	630	635
Asn Asp Asn Trp Trp Thr Gly Trp Arg	Gln Trp Ile Pro Ala Gly Ile	
645	650	655
Gly Val Thr Gly Val Ile Ile Ala Val	Ile Ala Leu Phe Cys Ile Cys	
660	665	670
Lys Phe Val Phe		
675		

<210> 5

<211> 2103

<212> DNA

<213> Marburg virus

<400> 5

taccctaaca tgaagaccac atgtttcctt atcagtctta tcttaattca agggacaaaa	60
aatctcccca ttttagagat agctagtaat aatcaacccc aaaatgtgga ttcggtatgc	120
tccggaactc tccagaagac agaagacgtc catctgatgg gattcacact gagtgggcaa	180
aaagtgtctg attccccctt ggaggcatcc aagcgatggg ctttcaggac aggtgtacct	240
ccaagaatg ttgagtacac agaggggggag gaagccaaaa catgctacaa tataagtgt	300
acggatccct ctggaaaatc cttgctgtta gatcctccta ccaacatccg tgactatcct	360
aatgcaaaa ctatccatca tattcaaggt caaaaccctc atgcacaggg gatcgccctt	420
catttatggg gagcattttt tctgtatgat cgcattgcct ccacaacaat gtaccgaggc	480
aaagtcttca ctgaagggaa catagcagct atgattgtca ataagacagt gcacaaaatg	540
attttctcgc ggcaaggaca aggtaccgt catatgaatc tgacttctac taataaatat	600
tggacaagta gtaacggaac gcaaacgaat gacactggat gtttcggcgc tcttcaagaa	660
tacaattcta caaagaacca aacatgtgct ccgtccaaaa tacctccacc actgcccaca	720
gcccgtccgg agatcaaact cacaagcacc ccaactgatg ccaccaaact caataccag	780
gaccaagca gtgatgatga ggacctcgca acatccggct caggggtccgg agaacgagaa	840
ccccacacaa cttctgatgc ggtcaccaag caagggcttt catcaacaat gccaccact	900

```

ccctcaccac aaccaagcac gccacagcaa ggaggaaaca acacaaacca ttcccaagat 960
gctgtgactg aactagacaa aaataacaca actgcacaac cgtccatgcc ccctcataac 1020
actaccacaa tctctactaa caacacctcc aaacacaact tcagcactct ctctgcacca 1080
ttacaaaaca ccaccaatga caacacacag agcacaatca ctgaaaatga gcaaaccagt 1140
gccccctcga taacaaccct gcctccaacg ggaaatccca ccacagcaaa gagcaccagc 1200
agcaaaaaag gccccgccac aacggcacca aacacgacaa atgagcattt caccagtcct 1260
ccccccaccc ccagctcgac tgcacaacat cttgtatatt tcagaagaaa gcgaagtatc 1320
ctctggaggg aaggcgacat gttccctttt ctggatgggt taataaatgc tccaattgat 1380
tttgaccag ttccaaatac aaaaacaatc tttgatgaat cctctagtgc tggcgctcg 1440
gctgaggaag atcaacatgc ctcccccaat attagtttaa ctttatctta ttttccta 1500
ataaatgaga aactgccta ctctggagaa aatgagaatg attgtgatgc agagttaaga 1560
atgtggagcg ttcaggagga tgacctggcc gcagggtca gttggatacc gttttttggc 1620
cctggaattg aaggacttta cactgctgtt ttaattaaaa atcaaaacaa tttggtctgc 1680
aggttgaggc gtctagccaa tcaaactgcc aaatccttgg aactcttatt gagagtcaca 1740
actgaggaaa gaacattctc cttaatcaat agacatgcta ttgactttct actcacaaga 1800
tggggaggaa catgcaaagt gcttgacact gattgttgca tcgggataga agacttgtcc 1860
aaaaatattt cagagcaaat tgaccaaat aaaaaggacg aacaaaaaga ggggactggt 1920
tggggctctg gtggtaaatg gtggacatcc gactggggtg ttcttactaa cttgggcatt 1980
ttgctactat tatccatagc tgtcttgatt gctctatcct gtatttgtcg tatctttact 2040
aaatatatcg gataacgtta aatgtgtaat gattaggact ttaggacaat tgctactgag 2100
ccc 2103

```

<210> 6

<211> 681

<212> PRT

<213> Marburg virus

<400> 6

```

Met Lys Thr Thr Cys Phe Leu Ile Ser Leu Ile Leu Ile Gln Gly Thr
1      5      10      15
Lys Asn Leu Pro Ile Leu Glu Ile Ala Ser Asn Asn Gln Pro Gln Asn
20      25      30
Val Asp Ser Val Cys Ser Gly Thr Leu Gln Lys Thr Glu Asp Val His
35      40      45

```

Leu Met Gly Phe Thr Leu Ser Gly Gln Lys Val Ala Asp Ser Pro Leu
 50 55 60
 Glu Ala Ser Lys Arg Trp Ala Phe Arg Thr Gly Val Pro Pro Lys Asn
 65 70 75 80
 Val Glu Tyr Thr Glu Gly Glu Glu Ala Lys Thr Cys Tyr Asn Ile Ser
 85 90 95
 Val Thr Asp Pro Ser Gly Lys Ser Leu Leu Leu Asp Pro Pro Thr Asn
 100 105 110
 Ile Arg Asp Tyr Pro Lys Cys Lys Thr Ile His His Ile Gln Gly Gln
 115 120 125
 Asn Pro His Ala Gln Gly Ile Ala Leu His Leu Trp Gly Ala Phe Phe
 130 135 140
 Leu Tyr Asp Arg Ile Ala Ser Thr Thr Met Tyr Arg Gly Lys Val Phe
 145 150 155 160
 Thr Glu Gly Asn Ile Ala Ala Met Ile Val Asn Lys Thr Val His Lys
 165 170 175
 Met Ile Phe Ser Arg Gln Gly Gln Gly Tyr Arg His Met Asn Leu Thr
 180 185 190
 Ser Thr Asn Lys Tyr Trp Thr Ser Ser Asn Gly Thr Gln Thr Asn Asp
 195 200 205
 Thr Gly Cys Phe Gly Ala Leu Gln Glu Tyr Asn Ser Thr Lys Asn Gln
 210 215 220
 Thr Cys Ala Pro Ser Lys Ile Pro Pro Pro Leu Pro Thr Ala Arg Pro
 225 230 235 240
 Glu Ile Lys Leu Thr Ser Thr Pro Thr Asp Ala Thr Lys Leu Asn Thr
 245 250 255
 Thr Asp Pro Ser Ser Asp Asp Glu Asp Leu Ala Thr Ser Gly Ser Gly
 260 265 270
 Ser Gly Glu Arg Glu Pro His Thr Thr Ser Asp Ala Val Thr Lys Gln
 275 280 285
 Gly Leu Ser Ser Thr Met Pro Pro Thr Pro Ser Pro Gln Pro Ser Thr
 290 295 300
 Pro Gln Gln Gly Gly Asn Asn Thr Asn His Ser Gln Asp Ala Val Thr
 305 310 315 320
 Glu Leu Asp Lys Asn Asn Thr Thr Ala Gln Pro Ser Met Pro Pro His
 325 330 335
 Asn Thr Thr Thr Ile Ser Thr Asn Asn Thr Ser Lys His Asn Phe Ser
 340 345 350
 Thr Leu Ser Ala Pro Leu Gln Asn Thr Thr Asn Asp Asn Thr Gln Ser
 355 360 365
 Thr Ile Thr Glu Asn Glu Gln Thr Ser Ala Pro Ser Ile Thr Thr Leu
 370 375 380
 Pro Pro Thr Gly Asn Pro Thr Thr Ala Lys Ser Thr Ser Ser Lys Lys

385		390		395		400
Gly	Pro	Ala	Thr	Thr	Ala	Pro
			405			Asn
				Thr	Thr	Asn
				410		Glu
					His	Phe
						Thr
						415
Pro	Pro	Pro	Thr	Pro	Ser	Ser
			420			Thr
						Ala
						425
						Gln
						His
						Leu
						Val
						430
Arg	Lys	Arg	Ser	Ile	Leu	Trp
		435				Arg
						440
						Glu
						Gly
						Asp
						Met
						445
						Phe
						Pro
						Phe
						Leu
Asp	Gly	Leu	Ile	Asn	Ala	Pro
	450					455
						Ile
						Asp
						Phe
						Asp
						Pro
						460
						Val
						Pro
						Asn
						Thr
Lys	Thr	Ile	Phe	Asp	Glu	Ser
	465					470
						Ser
						Ser
						Ser
						Ser
						Gly
						475
						Ala
						Ser
						Ala
						Glu
						480
Asp	Gln	His	Ala	Ser	Pro	Asn
			485			490
						Ile
						Ser
						Leu
						490
						Thr
						Leu
						Ser
						Tyr
						Phe
						495
Asn	Ile	Asn	Glu	Asn	Thr	Ala
			500			Tyr
						505
						Ser
						Gly
						Glu
						Asn
						Glu
						510
						Asn
						Asp
						Cys
Asp	Ala	Glu	Leu	Arg	Ile	Trp
	515					520
						Ser
						Val
						Gln
						Glu
						Asp
						525
						Asp
						Leu
						Ala
						Ala
Gly	Leu	Ser	Trp	Ile	Pro	Phe
	530					535
						Phe
						Gly
						Pro
						Gly
						Ile
						540
						Glu
						Gly
						Leu
						Tyr
Thr	Ala	Val	Leu	Ile	Lys	Asn
	545					550
						Gln
						Asn
						Asn
						Leu
						555
						Val
						Cys
						Arg
						Leu
						560
Arg	Leu	Ala	Asn	Gln	Thr	Ala
			565			Lys
						Ser
						Leu
						570
						Glu
						Leu
						Leu
						Leu
						Arg
						575
Thr	Thr	Glu	Glu	Arg	Thr	Phe
		580				585
						Ser
						Leu
						585
						Ile
						Asn
						Arg
						His
						Ala
						590
						Ile
						Asp
Phe	Leu	Leu	Thr	Arg	Trp	Gly
	595					600
						Gly
						Thr
						Cys
						Lys
						Val
						605
						Leu
						Gly
						Pro
						Asp
Cys	Cys	Ile	Gly	Ile	Glu	Asp
	610					615
						Leu
						Ser
						Lys
						Asn
						Ile
						620
						Ser
						Glu
						Gln
						Ile
Asp	Gln	Ile	Lys	Lys	Asp	Glu
	625					630
						Gln
						Lys
						Glu
						Gly
						635
						Thr
						Gly
						Trp
						Gly
						Leu
						640
Gly	Gly	Lys	Trp	Trp	Thr	Ser
			645			Asp
						Trp
						Gly
						650
						Val
						Leu
						Thr
						Asn
						Leu
						655
Ile	Leu	Leu	Leu	Leu	Ser	Ile
			660			665
						Ala
						Val
						Leu
						Ile
						Ala
						Leu
						Ser
						670
						Cys
						Ile
Cys	Arg	Ile	Phe	Thr	Lys	Tyr
		675				680
						Ile
						Gly

<210> 7

<211> 25

<212> DNA

<213> Artificial

<220>

<223> Primer

<400> 7

cgggatccac catgtctgcc gcgct

25

<210> 8

<211> 28

<212> DNA

<213> Artificial

<220>

<223> Primer

<400> 8

cgctctagat taccgacgca ttggttatg

28